

Relative Bed Stability Index Calculation for the Pete King Project

RBS Calculation Using Streambed Shear Stress

τ_{ci}	critical dimensional streambed shear stress	78.48387
τ_{ci}^*	critical dimensionless streambed shear stress	0.029693
ρ_s	density of sediment	2650 kg/m ³
ρ	density of water	997 kg/m ³
g	acceleration due to gravity	9.81 m/s ²
D_i	particle diameter/D ₈₄	0.163
θ	Shields dimensionless coefficient in homogenous sediment when $D_i/D_{50}=1$	0.045
D_{50}	mean particle diameter	0.09 m
x	slope of power relationship	0.7

τ	shear stress at bankfull elevation
ρ	density of flow
g	acceleration due to gravity
R	hydraulic radius/bankfull depth
S	water surface slope

61.32417	997 kg/m ³
	9.81 m/s ²
	0.57 m
	0.011 m/m

RBS Relative Bed Stability

1.3

RBS Calculation Using Stream Discharge

q_{ci}	critical unit discharge for entrainment of given size fraction	2.036097 m ² /s
a	critical unit discharge for reference size D_r	1.981206 m ² /s
D_i	particle diameter/D ₈₄	0.163 m
D_r	reference particle diameter	0.09 m
b	exponent	0.046012
q_c	critical unit discharge	1.981206 m ² /s
g	acceleration due to gravity	9.81 m/s ²
D	particle diameter	0.09 m
S	water surface slope	0.011 m/m
D_{16}	diameter of the 16th percentile streambed particle	0.005 m

q1.5	bankfull unit discharge at 1.5 year peak flood
q2	bankfull unit discharge at 2.0 year peak flood
q2.3	bankfull unit discharge at 2.33 year peak flood
q1.5	bankfull discharge at 1.5 year peak flood
q2	bankfull discharge at 2.0 year peak flood
q2.3	bankfull discharge at 2.33 year peak flood
wbf	bankfull width

0.637931 m ² /s	7.4 m ³ /s
0.784483 m ² /s	9.1 m ³ /s
0.887931 m ² /s	10.3 m ³ /s
	11.6 m

RBS Relative Bed Stability
RBS Relative Bed Stability
RBS Relative Bed Stability

3.2
2.6
2.3

NOTE: See Project File #E5.H23 for the methods used to calculate the Relative Bed Stability index values.